

RESPONSE TO QUESTIONS FROM THE SCIENCE AND EDUCATION PANEL

Submitted by:

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1. *What specific recommendations should the Commission make to address the connection between human health and ocean health?*

It has recently become very clear that there are strong connections between human health and ocean health. In 1999, after reviewing recent, relevant literature on this subject, a group of experts concluded that reports of diseases in the oceans are on the rise (Harvell et al., 1999). These experts attributed the rise to both climate links and anthropogenic factors. There is also the positive connection that is emerging as a result of new drug discovery in the sea (National Research Council, 1999).

In order to address these connections, I support the three approaches drafted and recommended by the Committee on the Ocean's Role in Human Health in 1999. This committee was created by the National Research Council's Ocean Studies Board (OSB) in 1998, with support from NOAA, NIEHS, and NASA. I was a member of this committee and I am presently a member of the OSB. In the following paragraphs, I will briefly reiterate the recommendations made in our committee's report (National Research Council, 1999). And I will place these recommendations in the context of newly developing initiatives and needs, for example, an integrated ocean observing system (IOOS) and homeland defense.

- I. There is a need to continue and enhance collection of information that will improve prediction and prevention of marine public health disasters. Such information includes:
 - A. Baseline observations of physical ocean properties in order to monitor climate variation on a global scale (some of this will come through an IOOS)
 - B. Measurement of oceanic and atmospheric variables to improve tropical storm predictions (some of this will come through an IOOS)
 - C. Collection of health statistics to support retrospective analyses
 - D. Documentation of harmful algal blooms (IOOS)

- II. New technologies are needed to help reduce risks to human health

- A. Drifting and moored sensors (monitored by satellite) need to be deployed more widely to accurately track ocean processes (IOOS)
- B. Biological sensors need to be developed to more rapidly and accurately detect risks to human health including risks from select agents of biowarfare and bioterrorism (some can be placed on the IOOS)
- C. Molecular methods need to be developed for improved detection of waterborne pathogens, including select agents (some can be integrated into biological sensors and become part of the IOOS)
- D. More accurate, cost effective methods for detecting algal toxins in seafood are needed

III. Contributions of marine organisms to medicine and health

- A. Marine biodiversity must be further explored for the benefit of drug discovery
- B. Molecular mechanisms of natural marine toxins need to be understood
- C. Develop better techniques to culture species with biomedical value
- D. Expand drug discovery efforts beyond anti-cancer compounds
- E. Encourage training and research to expand our knowledge of marine organisms

The Commission needs to endorse these recommendations, in the context of both traditional (e.g., marine tourism and recreation) and emerging (e.g., homeland defense) needs and opportunities. The Commission also needs to encourage the federal agencies to work together to develop and standardize new and improved tools for detection and forecasting. In particular, NSF, ONR, NIEHS, CDC, FDA, EPA, MMS, and NOAA need to work together and with the scientific community to better address the connection between human health and ocean health.

Literature Cited:

Harvell, C.D., K. Kim, J.M. Burkholder, R.R.Colwell, P.R. Epstein, D.J. Grimes, E.E. Hoffmann, E.K. Lipp, A.D.M.E. Osterhaus, R.M. Overstreet, J.W. Porter, G.W. Smith, and G.R. Vasta. 1999. Emerging marine diseases - climate links and anthropogenic factors. *Science* 285:1505-1510.

National Research Council. 1999. *From Monsoons to Microbes: Understanding the Ocean's Role in Human Health*. National Academy Press, Washington, D.C.

2. How can the U.S. best position itself as a leader on the issues of human health and ocean health?

Implementation of the recommendations referenced in Question 1, in the context of newly developing initiatives and needs, will help position the U.S. as a leader on the issues of human health and ocean health. The U.S. must also recognize that issues of human health and ocean health are not local; they transcend political and geographic boundaries. The health of our citizens and the health of our riparian oceans will not be improved and protected, if we do not work with other nations of the world. We must use existing international organizations, such as

the WHO, the OECD, and the United Nations, to better understand and mitigate risks and problems. We must also endeavor to catalog and preserve biodiversity, because both human health and ocean health are intimately related to biodiversity on the planet Earth. The U.S. would be applauded by all nations, if it would interpret and share the recommendations of the U.S. Commission on Ocean Policy with other nations of the world. Certainly, the recommendations like the issues will transcend political and geographic boundaries.